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The Relationship Of Physical Activity And Calcium To Bone In Childhood And Adolescence Depends On Sex And Pubertal Status: 863: June 1 3:30 PM - 3:45 PM

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PURPOSE: Although physical activity (PA) and calcium consumption are critical to bone health, intervention late in life is unlikely to reverse established osteoporosis. Maximising the development of bone in youth may be a critical preventative strategy for osteoporosis; however, optimal timing of exposure to PA and calcium relative to sex and pubertal development is contentious. Our aim was to determine the relationship of PA and dietary calcium to bone strength parameters in childhood according to pubertal status and sex.

METHODS: A sample of 268 mainly Caucasian boys and girls aged 5-17 years was recruited from the community. Whole body (WB), lumbar spine (LS) and femoral neck (FN) bone mineral density (BMD) and content (BMC) were determined from dual-energy x-ray absorptiometry (DXA, XR800, Norland). Tibial and radial fracture loads (FL) were obtained from peripheral quantitative computed tomography (pQCT, XCT3000, Stratec). PA and calcium consumption were determined from validated questionnaires. Pubertal status was derived from Tanner staging.

RESULTS: For boys, past PA and calcium together predicted between 15.3-22.7% of the variance in all BMD and BMC measures and tibial FL in the combined age analyses ($p < 0.05$). For girls, calcium alone predicted 6-8.3% of the variance in WB and LS BMD, LS BMC and radial FL in the combined age analyses ($p < 0.05$), while PA also contributed to the model for FN and WB BMC (8.8 and 9.4%, respectively; $p < 0.05$). In combined-sex analyses, prior to and after puberty PA alone predicted variance in WB BMC (3.9%, 18.5%), FN BMD (4%, 4.8%), FN BMC (4%, 8.3%), LS BMC (9.5%, 9%) and tibial FL (3.7%, 19.2%) ($p < 0.05$). PA alone predicted 1-9% of the variance in WB and LS BMD at all pubertal stages, but at peri-puberty, calcium alone predicted 1.6% and 3.7% of the variance in WB and FN BMC and 1.8% and 3.2% of radial and tibial FL ($p < 0.05$).

CONCLUSIONS: In general, PA explained more of the variance in bone strength parameters for boys than girls, while calcium explained more of the variance in bone for girls than boys. PA contributed most strongly to bone strength parameters before and after puberty, while calcium was more influential during puberty.

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